

3.12 Health and Safety

3.12.1 Sources of Information

Information on the location of the existing natural gas pipeline and the transmission lines was obtained through existing mapping and field surveys.

Information on electric and magnetic fields (EMF) and electric shock impacts was obtained from the Resource Contingency Program – Washington Final Environmental Impact Statement, Satsop Combustion Turbine Unit 1, Chehalis Generation Facility, published by Bonneville Power Administration, November 1995; from Black & Veatch; and from recent articles published on EMF.

3.12.2 Existing Conditions

The S2GF would be constructed on a vacant 37-acre site located within an industrial zone in the City of Sumas.

The proposed natural gas pipeline would be routed in an existing ROW parallel to an existing 8-inch-diameter, 4.5-mile natural gas pipeline that provides natural gas to the SCCLP cogeneration plant.

Potable/process water supply pipelines and process/domestic wastewater collection pipelines would be extended to the S2GF from the City of Sumas along road and utility ROWs.

The proposed 230 kV electrical transmission line to the Canadian border would be routed mostly along an existing railroad ROW. The optional 115 kV electrical transmission line routes in Whatcom County would follow existing transmission and distribution line ROWs for approximately 90 percent of the combined total length of approximately 48 miles.

3.12.3 Environmental Impacts of Proposed Action

3.12.3.1 Construction

Generation Facility

Hazardous material use during construction of the S2GF would be primarily limited to chemical cleaning of the Heat Recovery Steam Generator (HRSG) and process piping before being placed in service. This work is performed by a specialized contractor qualified to handle the materials. The contractor would be responsible for providing,

using, and properly disposing of chemicals. A contractor has not been selected at this time so the specific chemicals to be used are not known. The following is a list of typical chemicals that are used during the chemical cleaning of the HRSG and piping:

- Aqueous ammonia
- Surfactant
- Corrosion inhibitors
- Citric or other similar acid
- Sodium nitrate
- Ammonium bicarbonate
- Anti foam agent

In addition, hazardous liquids whose use could generate solid or hazardous waste during construction include diesel fuel and gasoline, lubricants, cleaning solvents, paint, and paint residues. Also, hazardous solid waste materials could be generated by these fluids during a spill and the subsequent cleanup. Other hazardous wastes that would likely be generated include used oil, spent antifreeze, unused adhesives, discarded water treatment chemicals and residuals, and spent lead acid batteries. Non-hazardous solid waste associated with construction activities could include empty containers, scrap wood, scrap metals, and trash.

All solid and hazardous wastes produced during construction will be managed in accordance with applicable federal, state, and local laws and regulations. This will include transfer of wastes to appropriate facilities for recycling, treatment, processing, or disposal.

A stormwater pollution prevention plan will be developed to address the construction activities and handling of hazardous substances associated with the construction of the generation plant, as well as the gas, water, and wastewater pipelines and the transmission lines. The plan will address structural controls (silt fences, straw bale barriers, etc.), vegetation practices (temporary and permanent cover), and site management of solid/liquid/hazardous wastes.

The risk of a significant fire or explosion during construction of the facility is considered to be extremely low. During construction small quantities of flammable liquids and compressed gases would be stored and used. Liquids used include construction equipment fuels, paints, and cleaning solvents. Compressed gases used include acetylene, oxygen, helium, hydrogen, and argon for welding. The potential hazards associated with these materials will be mitigated by following construction safety requirements found in Chapter 296-155 WAC and 29 CFR 1926 (OSHA).

Natural Gas Pipeline

In general, the pipeline construction process includes the following steps. First the permanent and construction ROW is cleared and topsoil is pushed to one side of the ROW. As the trench is excavated, the pipeline would be constructed in sections at the edge of the trench. After the welds are X-rayed, the pipe would be lowered into the

trench using a series of side booms. There are tie-in welds made in the trench that are X-rayed in the trench. Once the pipe is placed and the trench is backfilled with soil, the pipe will be pressure tested with water. Onsite inspectors representing the owner will be present during construction to verify that the contractor is following all engineering specifications and meeting all regulatory requirements.

The risks of fire or explosion during construction of a pipeline are minimal. Soils excavation, welding the steel pipe, and backfilling are the primary tasks required. The construction of the proposed gas pipeline presents a slightly higher risk than normal in this case because of the proximity to an existing gas pipeline. If the existing pipeline were damaged during construction, natural gas might be released. The high pressure involved would be likely to cause an explosion and fire. Being lighter than air, the natural gas would disperse over a wide area. Evidence of a gas leak would be readily apparent because the gas in the pipeline has an odor. However, if a source of ignition were also present, a natural gas release could result in a fire or explosion.

The following safety procedures are followed during construction:

- Construction will be performed by a qualified and experienced pipeline construction contractor.
- Prior to construction, the existing natural gas pipeline will be located and staked. It will be physically located every 1,000 feet and at intersections of other pipes and crossings. This will confirm the location and depth to ensure new construction does not affect the existing line.
- A minimum clearance space (buffer zone) of 10 feet will be maintained between the existing and new pipe.
- Construction methods and safety procedures will be established to avoid striking or damaging the existing pipe in any way.
- Heavy equipment will not normally be operating over the existing pipeline during construction of the new line. If heavy equipment or trucks must cross the existing natural gas pipeline, they will cross at right angles and the ground will be bridged with mats or additional soil cover to protect the existing pipe.
- Inspectors will be onsite during construction to verify that the contractor is following all safety procedures.

The use of these mitigation methods should reduce the risk of fire or explosion during construction.

Radiation will be used in the field to test pipeline welds radiographically. The testing and controlled use of radiation will be performed in accordance with state and federal regulations and industry standards by a certified testing laboratory using qualified personnel.

During construction, the pipeline trench will be covered or secured with construction barriers after work hours to deter persons or livestock from entering the active construction area.

3.12.3.2 Operation

Generation Facility

Operation of the S2GF would require the use of natural gas, distillate fuel oil, and ammonia for emission control. The natural gas would be piped directly to the user, with no onsite storage. Backup fuel oil would be stored in a diked 2,500,000-gallon storage tank resting on an impervious liner. The emergency diesel generator fuel would be stored in a 1,000-gallon above-ground double-walled tank. Smaller quantities of lubricating oils would be contained in the three turbine generator lubrication oil reservoirs and systems. Ammonia would be stored and used in an ammonia system that meets code requirements.

Operation of the S2GF would not produce any spent fuel wastes such as ash. A very small amount of sludge will be formed in the cooling tower, but is not expected to be designated as a dangerous waste under state regulations. It is expected that this waste will be disposed of in a landfill.

Toxic and hazardous materials used during operation of the project will be handled, stored, and disposed of in accordance with applicable state and federal regulations as described below, and would not result in a threat to public health and safety. A Hazardous Materials Management Plan will be prepared for the facility to meet the local Fire Marshall's requirements and other applicable regulations.

Small amounts of hazardous wastes would be generated by the facility, such as used paints, thinners, solvents, and vehicle/equipment lubricating oils. These wastes will be managed to ensure compliance with the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC). It is expected that the hazardous wastes produced would include primarily solvents and paint wastes generated during maintenance activities. A generator number has not as yet been assigned.

Title III of the Superfund Amendments and Reauthorization Act (SARA Title III) and the Occupational Safety and Health Administration's Hazard Communications Standard mandate communication of information to local agencies to assist in response to emergency situations. Material Safety Data Sheets (MSDS) that provide specified information on each toxic or hazardous material stored and used onsite would be maintained on file. A listing of MSDSs would be provided to local emergency response agencies. The MSDS describes the potential health effects of a given substance under different types of exposure and appropriate safety and treatment measures. S2GF will provide an annual inventory of the toxic and hazardous materials used onsite in accordance with industry standard (Tier 2) reporting requirements.

If any substance listed in 40 CFR 302 is released to the environment during the operation of the facility, S2GF will notify EFSEC, the National Response Center, U.S. EPA, and the Washington Department of Ecology as required under Section 101(14) of the Comprehensive Environmental Response Compensation Liability Act (CERCLA) and the Washington State Model Toxics Control Act (MTCA, Chapter 70.105D RCW), and implementing regulations (Chapter 173-340 WAC). In the event of a release, wastes will be handled in accordance with applicable regulations, including Chapter 173-303 WAC.

A representative list of applicable codes and regulations is presented in Appendix B of the ASC (Sumas Energy 2 et al. 2000). Based on the timing of construction, the most current versions of the applicable codes and regulations will be followed.

The combustion turbine generator units will be equipped with a specialized fire detection and protection system. Gas detectors will alarm when combustible gas in the combustion turbine unit enclosures reaches 25 percent of the Lower Explosive Limit (LEL). If combustible gas concentration increases to 60 percent of LEL, the gas detectors will shut down the combustion turbine and close the gas supply trip valve to the unit. The vent fans in the turbine enclosure will help to clear the combustible gas out of the enclosure. Thermal fire detectors and smoke detectors are located throughout the combustion turbine generator enclosure. Excessive heat or smoke will trip the detectors which in turn release a fire-smothering gas or a dry fire extinguisher.

The 2,500,000-gallon backup fuel oil storage tank will be provided with a foam chamber, piping valves and nozzles for connection to a portable foam system or truck.

The lubrication oil system reservoirs will be equipped with fire detectors and a water deluge system that will be initiated automatically.

The diesel generator building will be equipped with fire detectors and an automatically operated deluge system.

The ammonia storage facility will be equipped with ammonia leakage detectors and an automatically initiated water deluge system to cool the ammonia storage tank. The entire ammonia system will be designed and built to comply with the most current ammonia system codes.

Water for fire control will be stored in a tank onsite. A jockey pump will keep the onsite system of hydrants and deluge systems pressurized. Upon operation of a deluge system or opening of a fire hydrant, the fire pumps will automatically provide water for response to fires as required. The public services and utilities section of this EIS (in Section 3.8) describes the adequacy of the fire fighting resources in the area.

The facility will be operated by qualified personnel using written procedures. Procedures will provide clear instructions for safely conducting activities involved in the initial startup, normal operations, temporary operations, normal shutdowns, emergency shutdowns and subsequent startups. The procedures for emergency shutdowns will include the conditions under which emergency shutdowns are required and the assignment of shutdown responsibilities to qualified operators to ensure that shutdowns

are accomplished in a safe and timely manner. The procedures will also address the consequences of operational deviations and the steps required to correct or avoid such deviations.

An Emergency Response Plan will be prepared for the S2GF to ensure employee safety from the following emergencies: onsite chemical release, flood, medical emergency, major power loss, fire, extreme weather, earthquake, volcano, and bomb threat. The plan will be established prior to completion of construction. The plan will follow requirements of WAC 296-24-567 and 296-62-3112 and CFR 1910.38, Emergency Action Plan. All hourly and salaried employees, including administrative staff, as well as contractors and visitors will be covered by the plan.

Prior to commencement of operations, employees will be trained on the facility's Health and Safety Plan and Emergency Response Plan. They will also receive training regarding the operating procedures and other requirements for safe operation of the plant. In addition, employees will receive annual refresher training, which will include a test of their understanding of the procedures. Training and testing records will be maintained per OSHA and WDOT standards.

The types of chemicals and hazardous materials to be used and stored onsite during operation are listed in Table 2-1 in Chapter 2. Engineered safeguards will be in place during time of operation to minimize the potential for discharge of any hazardous material to the environment. Licensed contractors will be responsible for transporting, treating, and/or disposing of the waste generated onsite in accordance with applicable federal, state, and local requirements. Asbestos or materials containing polychlorinated biphenyls (PCBs) will not be used in the construction or operation of the facility.

Transmission Lines

Electric and Magnetic Fields

Electric and magnetic fields (EMF) are a natural occurrence produced by the earth itself. EMFs are also produced by any device which consumes or conducts electricity such as lights, televisions, appliances, radios, shavers, computers, wiring in houses and offices, as well as electrical transmission and distribution lines.

Both electric and magnetic alternating current fields induce currents in conducting objects, including people and animals. All of the electrical wiring in homes and offices, for example, emit EMF when power is turned on.

Some scientists believe that exposure to these fields might be potentially harmful and that long-term exposure should be minimized. Hundreds of studies on electric and magnetic fields have been conducted in the United States and other countries. Studies of laboratory animals generally show that these fields have no obvious harmful effects, but subtle effects of unknown biological significance have been reported in some laboratory studies (Frey 1993).

Over the past decade, some attention has been focused on the suggestion in some research reports that workers in certain electrical occupations and people living close to power lines have an increased risk of leukemia and other cancers (Sagan 1991, National Radiological Protection Board 1992, Oak Ridge Associated Universities Panel 1992). However, the most recent scientific reviews conclude that the overall evidence is too weak to establish a cause-and-effect relationship between EMF and cancer (National Research Council 1996, National Institute of Environmental Health Sciences 1999).

The U.S./Canadian 230 kV transmission line is routed from the S2GF site along an existing railroad line, and then along a roadway to the U.S./Canadian border. This 230 kV would transmit at 1,570 amps. EMF levels associated with this transmission are estimated to be approximately 197 milligauss (mG) directly under the line, tapering off to approximately 21 mG at 100 feet perpendicular to the line, and 8 mG at 200 feet. There are a few homes in the area, however it is unlikely that any of them are close enough to experience any increase in EMF exposure from the new lines. The nearest building to the proposed line is about 200 feet away.

More than 90 percent of the two optional 115 kV Whatcom County transmission lines would be built by replacing (overbuilding) the existing 12.5 kV distribution or communication lines and poles. The new poles and lines would be considerably taller than the existing poles and lines (see Figure 2-4 in Chapter 2).

EMF levels are associated primarily with current and not line voltage. Line voltage plays a role in EMF only by determining the amount of current flowing on the line (for a given amount of megawatts generated, doubling the line voltage results in halving the line current) and by influencing the spacing between conductors (wires) of the three-phase circuit. The wire spacing generally increases as the voltage increases. Greater spacing between wires lowers the cancellation effect on EMF levels. The increased phase to phase spacing on the 230 kV line into Canada (thus less efficient cancellation between phases) is the primary reason for much larger peak EMF levels near the line when compared to the 115 kV alternatives even though current levels are similar.

Because the Whatcom County alternatives are limited to 115 kV, it would be necessary to export the S2GF energy with two separate circuits (lines). The current levels on the two 115 kV lines are slightly different due to the configuration of the S2GF generation and associated substation. In order to avoid loop-flow through the S2GF lines, each line will be isolated from each other (radial lines). The line to Custer would deliver the energy generated by the two combustion turbines (minus station service) and the Bellingham line would deliver the energy generated by the steam turbine. The combined current associated with the two 115 kV lines is roughly twice that of the single 230 kV line into Canada because the same energy in megawatts delivered at half the line voltage results in doubling the current.

The current in the S2GF/Bellingham 115 kV line would be approximately 1,470 amps per phase. The current in the S2GF/Custer 115 kV line would be approximately 1,665 amps per phase.

Table 3.12-1 provides an estimate of the existing peak EMF levels associated with the existing single-phase and three-phase 12.5 kV distribution lines along the two Whatcom County routes as compared to the 115 kV transmission lines overbuilt on these existing 12.5 kV distribution lines. The peak EMF levels directly under the 115 kV lines would be higher than the existing EMF levels. However, for the S2GF/Bellingham route, at distances of 60 feet or more from the line, the maximum EMF levels would be lower than the existing single-phase distribution lines. For the S2GF/Custer route, at a distance of 80 feet or more from the line, the maximum EMF levels would be lower than the existing single-phase distribution lines. The EMF levels of the 115 kV lines as compared to the three-phase distribution lines will be higher. Thus, approximately 60 percent of the route would result in increased levels of EMF as a result of the new lines. The nearest residence to either line ROW edge would be approximately 75 feet.

Table 3.12-1: Comparison of Estimated EMF Levels (mG) with Existing Whatcom County Distribution Lines and Optional (Overbuilt) 115 kV Transmission Lines

Location Relative to Line	Single-Phase 12.5 kV Distribution Line	Three-phase 12.5 kV Distribution Line	S2GF/Bellingham 115 kV Overbuilt on 12.5 kV Distribution	S2GF/Custer 115 kV Overbuilt on 12.5 kV Distribution
Directly under the line	50.8	35.9	58.6	64.3
100 feet from/perpendicular to the line	14.5	3.0	11.6	13.1
200 feet from/perpendicular to the line	7.5	0.8	3.5	3.9

Figures 3.12-1 through 3.12-5 provide calculated EMF profiles for the lines described previously.

Figure 3.12-1

**TYPICAL PSE 12.5 KV DISTRIBUTION LINE
1 PHASE ARMLESS**
(DISTRIBUTION LOAD @ 230 AMPS)

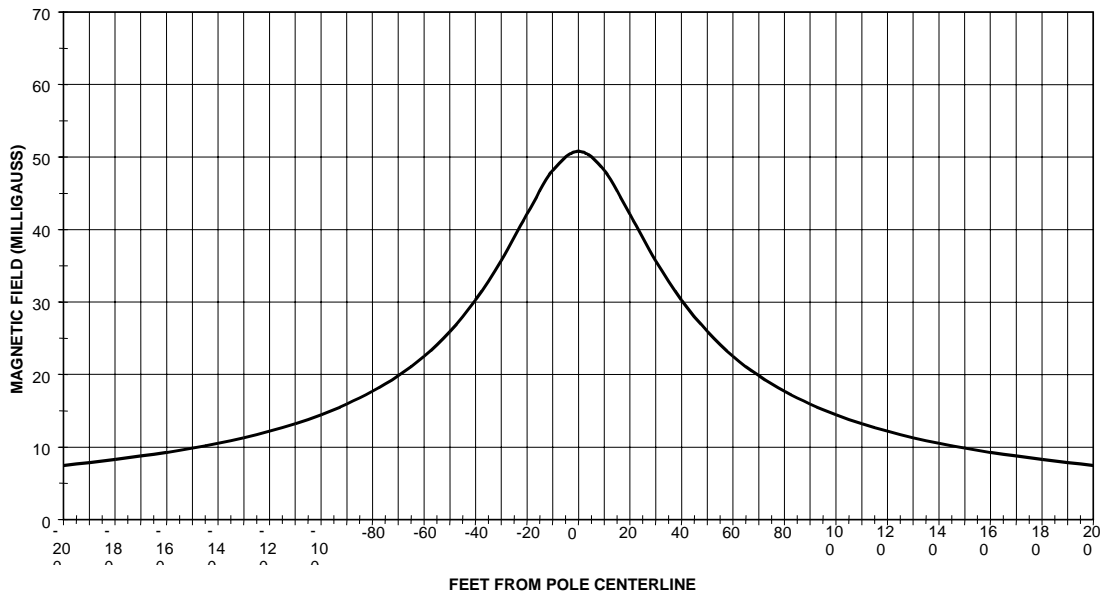


Figure 3.12-2

**TYPICAL PSE 12.5 KV DISTRIBUTION LINE
3 PHASE ON CROSSARM**
(DISTRIBUTION LOAD @ 550 AMPS)

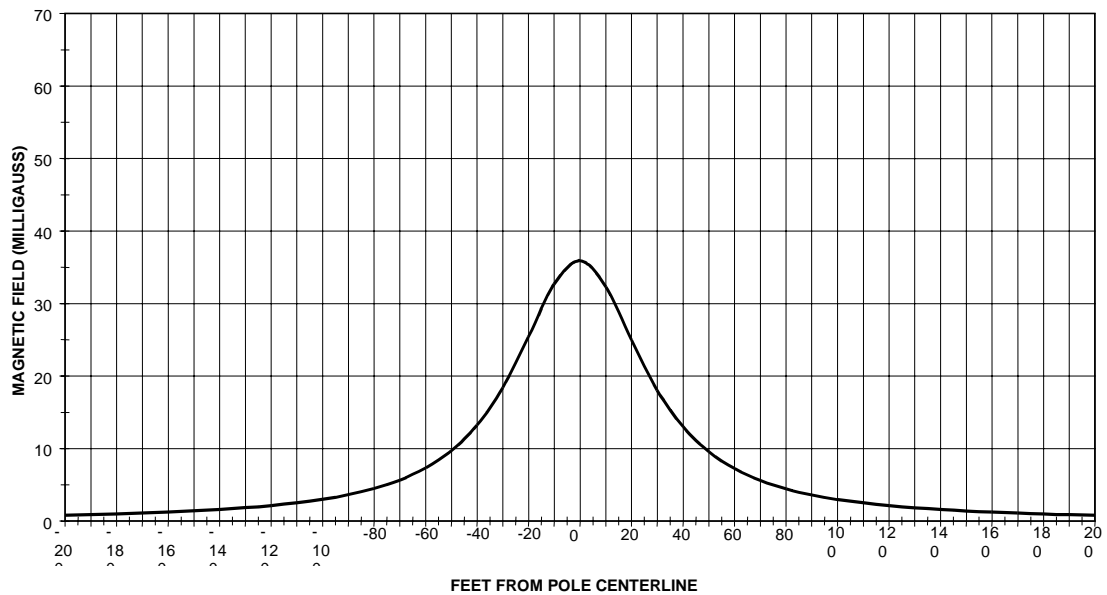


Figure 3.12-3
S2GF/BELLINGHAM 115 KV LINE
WITH 3 PHASE 12.5 KV UNDERBUILD

(TRANSMISSION LOAD @ 1470 AMPS)
(DISTRIBUTION LOAD @ 550 AMPS)

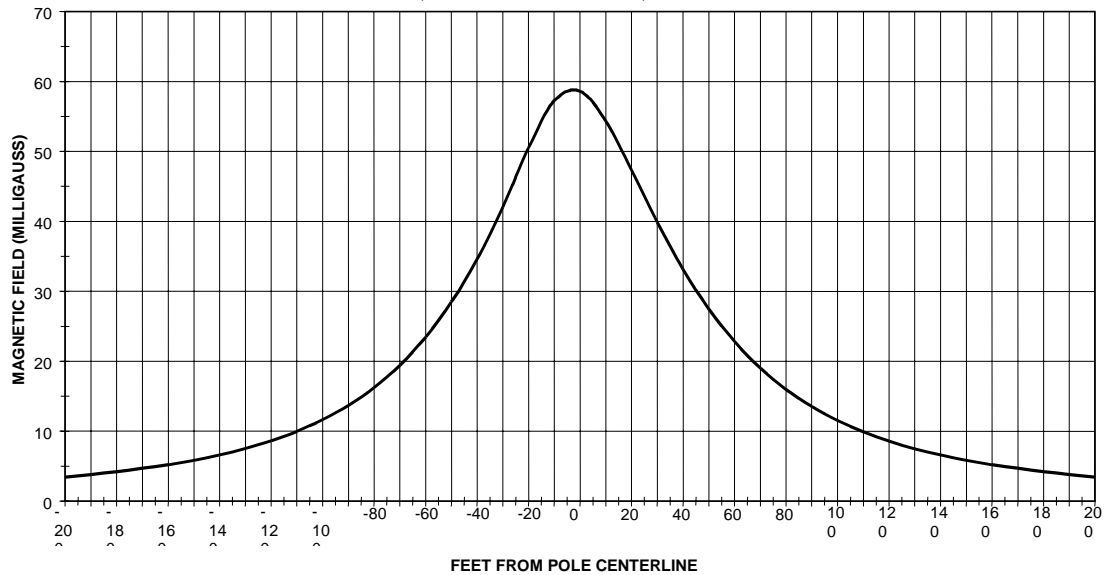


Figure 3.12-4
S2GF/CUSTER 115 KV LINE
WITH 3 PHASE 12.5 KV UNDERBUILD
(TRANSMISSION LOAD @ 1665 AMPS)
(DISTRIBUTION LOAD @ 550 AMPS)

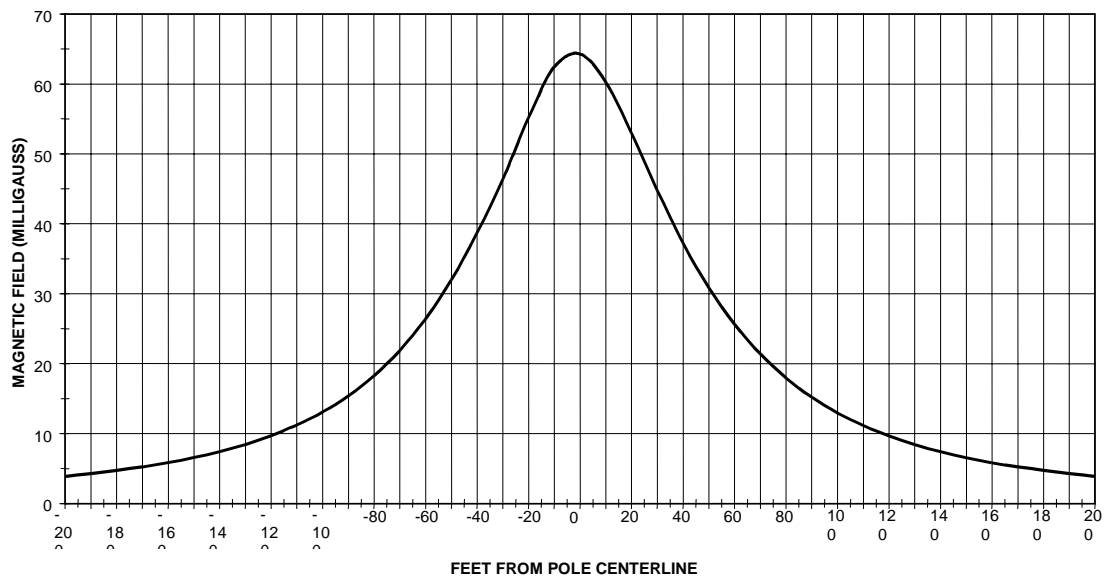
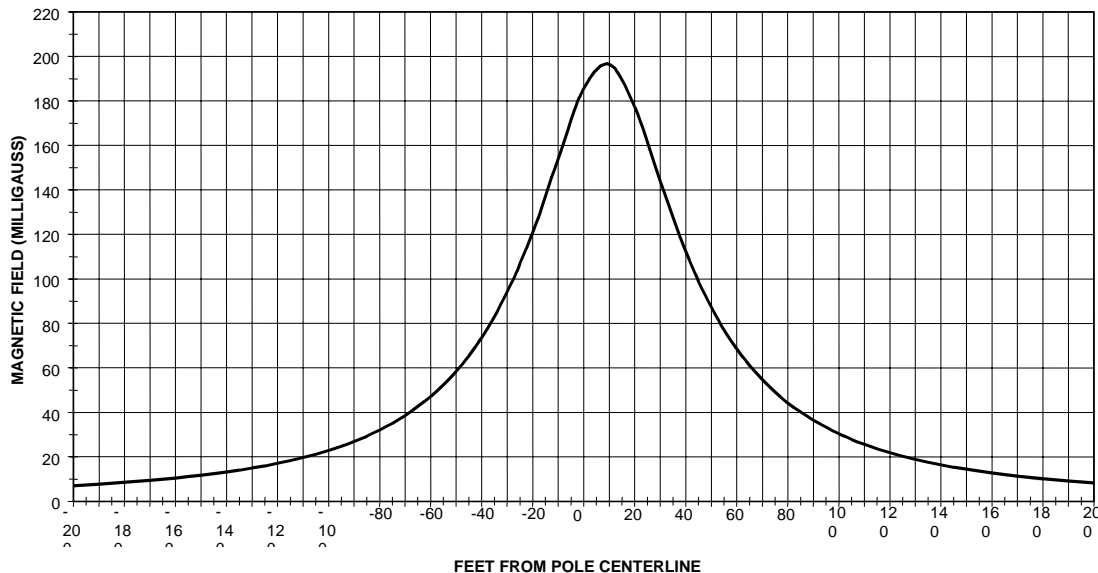


Figure 3.12-5
S2GF/CANADIAN 230 KV LINE
(TRANSMISSION LOAD @ 1570 AMPS)



Electrical Shock

Power lines, like electrical wiring, can cause serious electric shocks if precautions are not taken in their design and construction. All of the proposed lines (both the U.S./Canadian lines and the Whatcom County lines) will be designed and constructed in accordance with the National Electrical Safety Code (NESC). NESC specifies the minimum allowable distances between the lines and the ground or other objects. These requirements determine the minimum distance to the edge of ROW and the height of the line (i.e., the minimum required distance between the lines and houses, other buildings, and roadways, to reduce electric and magnetic field effects to acceptable levels).

People must also take precautions when performing work-related or leisure activities near power lines, to avoid possible electrocution through contact, such as installing television antennae or irrigation pipes too close to the lines.

Transmission lines can also induce voltages into objects near the lines. This effect can lead to nuisance shocks if a voltage is induced onto something like wire fencing installed on wood posts, and therefore insulated from the ground. However, this usually only becomes a problem with lines of voltages above 230 kV and is not anticipated to occur with the proposed transmission lines in either Whatcom County or the U.S./Canadian line. Should problems develop, simple grounding techniques can be used to eliminate the problem.

Natural Gas Pipeline

Natural gas pipelines are the only practical means of transporting and using natural gas. Pipelines are in use throughout the world. Various codes, regulations, and industry standards define how natural gas pipelines are designed and operated.

Ground movement/mass wasting is one of the biggest hazards to buried natural gas pipelines. The three most recent natural gas explosions in western Washington (Castle Rock, 1995; Everson, 1997; Kalama, 1997) appear to have been caused by ground movement on slopes. The ground along the proposed pipeline route is flat and stable, and there are no bridge crossings. The new pipeline would be constructed parallel to the existing pipeline that has been in place since 1992. The existing line has not experienced any damage from ground movement or mass wasting.

The route will be patrolled on a regular basis and checked by trained personnel (following a written qualification program required by 49 CFR Part 192) in order to anticipate potential problem areas early. The following events are typical of those to be investigated and reported:

- Any evidence of a gas leak (dying or dead vegetation, odor)
- Actual or threatened ground movement
- Flooding or unusual erosion of roads, banks, easements, or ROWs, including the investigation for possible stream migration and stream scour
- Subsidence or cracking of land and paved surfaces
- Construction, land leveling, or excavation work by others on or adjacent to the pipeline
- Required maintenance on company facilities, such as gates, fences, foot patrol roads, weed or brush removal
- Subdivision planning, surveying, or construction activity in the vicinity of the pipeline
- Missing or mutilated pipeline markers, or inadequately marked pipelines
- Evidence of gunshot damage or corrosion on exposed piping and components
- Evidence of vandalism
- Inoperative or damaged cathodic protection facilities

Regular natural gas leak surveys will be performed at intervals outlined in 49 CFR Part 192.706 and 192.723, by personnel walking the pipeline ROW directly above the pipeline, using appropriate natural gas instrumentation.

Any time there is evidence of a natural gas leak, the individuals conducting the patrol shall use a combustible gas indicator (CGI) to determine ambient gas concentrations in the soil and air, and shall immediately notify the S2GF plant engineer of the leak. The emergency response plan, as described in Section 7.2 of the ASC, will then be implemented. The plan is designed to address all types of emergencies that could occur at the plant or along the natural gas pipeline.

The aboveground natural gas pipeline facilities will be inspected weekly, monthly, and annually, and maintained according to the operation and maintenance plan to meet or exceed all regulatory requirements.

The probability of S2GF gas line failure is also minimized by reducing the opportunities for failure. Pipeline appurtenances are limited to the fenced valve station at the Canadian border and within the fenced areas of the plant site. The pipeline is buried in all other uncontrolled locations. Access to the border valve station is through farm fields so it is unlikely a runaway vehicle could crash the fencing and cause damage to the facility. Pedestrian access is available only to authorized personnel. Gas line appurtenances will be protected on the plant site, and offsite, by being contained within buildings or within immediate fenced areas. Bollards will be erected as required to ensure that onsite vehicles are not able to reach critical areas. Access to critical areas will be controlled by keyed entries and limited to authorized personnel.

The pipeline will be protected against corrosion by a sacrificial anode cathodic protection system. The system prevents corrosion by counteracting or preventing the electrolytic currents that cause corrosion. The pipeline will be coated with fusion-bonded epoxy or an equivalent watertight coating to minimize the possibility of corrosion occurring. The pipeline will also be inspected on a regular basis (every five years) using internal inspection devices commonly known as "smart pigs," to verify pipe wall thickness and integrity.

There is a slight risk of releasing natural gas into the environment during operation. Pressure control instrumentation will be used to keep the pipeline operating within specified pressure limits. Emergency relief valves with vent stacks will be installed to prevent the pressure in the line from rising above maximum allowable operating pressure. The relief valve will discharge to a safe point where the released natural gas will rapidly dissipate into the air. A gas system alarm will draw the plant operator's attention to the problem. Gas will not be released to the atmosphere from any other section of the pipe.

3.12.4 Environmental Impacts of No Action

There would be no environmental impacts to health and safety from the No Action Alternative.

3.12.5 Mitigation Measures

3.12.5.1 Construction

Line markers at 1,000-foot intervals are not likely to be visible by backhoe operators. The line should be marked so that any excavating equipment operator knows the location of the existing line.

No additional mitigation measures beyond those included as part of the construction plans have been identified.

3.12.5.2 Operation

A Spill Prevention, Control, and Countermeasure (SPCC) Plan will be prepared by SE2, and approved by EFSEC, within six months after operation of the facility to show capability to handle any spills that might release oil upon waters of the United States. This plan must show compliance with federal rules governing such plans and be certified by a registered professional engineer.

As discussed in Section 3.8, S2GF needs to enter into or reiterate appropriate mutual aid agreements with the City local fire marshal and potentially with refineries at Cherry Point or in Canada to ensure adequate response in the event of a spill or fire/explosion involving the 2.5-million-gallon fuel tank.

3.12.6 Cumulative Impacts

The potential for exposure to hazardous fuel and non-fuel hazardous substances would increase. However, all necessary control measures will be taken to minimize the likelihood of an accidental release. Therefore, the cumulative impacts would be low.

3.12.7 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts have been identified.